Boston Water and Sewer Commission

SUPPORTING DOCUMENTATION FOR THE 1989 RATE SCHEDULE

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425 Summer Street
Boston, MA 02210-1700
617-330-9400

January 26, 1989

Councillor Christopher A. Ianella
Boston City Council
Boston City Hall
One City Hall Plaza
Boston, MA 02201

Dear Councillor Ianella:

The enclosed supporting documentation for the 1989 Rate Schedule is sent for your perusal.

As you know after a Public Hearing held on December 8, 1988, the Board of Commissioners voted to approve the continuation of a ten-tier block rate structure in 1989 to encourage more efficient and less wasteful use of water in the City of Boston.

Also Boston's elderly and fully disabled resident homeowners currently receive a 25% discount on all water charges. For 1988 we estimate that this discount resulted in a decrease in water charges to the disabled and elderly of approximately $475,000 and in 1989 the savings will be approximately $583,000.

Should you have any questions, please do not hesitate to call me.

Very truly yours,

Ronald A. Catena
Director of Public Affairs

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I. EXECUTIVE SUMMARY

Section I.1 EXECUTIVE SUMMARY

The Boston Water and Sewer Commission (BWSC or Commission), a political subdivision of The Commonwealth of Massachusetts, was created by an Act of the Massachusetts State Legislature on August 5, 1977. On that date, the Commission was charged with the responsibility of providing water and wastewater services to the City of Boston, a function that had previously been performed by the Public Works Department of the City. BWSC currently serves approximately 87,600 customers.

Among other mandates, the Commission's Enabling Legislation requires that fees, rates and charges for water and sewerage services be established on just and equitable standards. All consumers, without discrimination, must pay their fair share of the costs of such services based upon their actual usage. A discount on water charges is provided to certain elderly and fully disabled customers. Rates and charges are set to generate revenues sufficient to permit the operations of the Commission to be self-sustaining. Any surplus generated is, by legislation, either returned to the City of Boston or utilized to offset the following year's rates, and any deficit is to be recovered in the following year's rates. In addition to establishing a rate structure which is adequate with respect to full cost recovery, the Commission also considers a number of other requirements in the review of its rates. In this regard, BWSC must ensure compliance with existing relevant legislation, bond resolutions and rate covenants.

The approved rate schedule is set forth in Exhibit A (pg. 6). It has been determined in accordance with legislative mandates, the Commission's financial requirements, and generally-accepted rate making practices. The approved water rates represent an increase of 20%; the approved sewer rates represent an increase of 35.5%. The combined increase for the approved rates is 28%. These rates became effective on January 1, 1989.

The approved rates reflect the costs of the Commission's 1989 Operating Budget plus projected revenue adjustments. Total approved revenues and expenses for 1989 are $127.4 million. Of this total, $64.1 million or 50 percent represents the assessments which the Commission must pay to the Massachusetts Water Resources Authority (MWRA or Authority) for water and wastewater services. The projected increase of 52.5 percent in the MWRA assessment is BWSC's most significant cost increase for 1989.

The approved water and sewer charges consist of a ten-tiered inclining block rate structure. BWSC adopted this rate structure in 1985. In general, the first four blocks of the ten-block tier correspond to customers in single and multi-family residences, or professional and small commercial offices. The fifth through eighth blocks reflect large multi-unit residences, medium to large commercial businesses, or small industries. The ninth and tenth blocks apply almost exclusively to medium and large industrial customers.

The Commission approved the continuation of the ten-tier inclining block rate structure in 1989 to encourage more efficient and less wasteful use of water in the City of Boston. The impact of the proposed rate schedule is shown in Exhibit B (pg. 7).

In addition to providing water and wastewater services, the Commission furnishes certain other special services to the community. The approved Special Service Fee Schedule recovers the costs for the provision of these additional services without burden to the general rate payer. The approved Special Service Fee Schedule is summarized in Exhibit C (pg. 8).

The Commission approved the institution of a Septage Disposal Fee for contractors who dispose of septage in BWSC's wastewater collection system. The establishment of this fee has primarily been based on the user charge for wastewater services, but also incorporates the recovery of the administrative costs for the regulation and billing of providing this service.

The Commission charges separately for the high pressure private fire protection system in place in downtown Boston. The approved Special Fire Service Fee Schedule for 1989 is shown in Exhibit D (pg. 11).

The Commission assesses a late payment charge of .03288% interest per day compounded with each billing on all amounts which are not paid within 45 days of the billing date (see Exhibit E on pg. 11).

Elderly and fully disabled resident homeowners currently receive a 25% discount on all water charges. For 1988, Staff estimated that this discount will result in a decrease in water charges to the disabled and elderly of approximately $475,000. Staff projects that the total savings on water charges generated by this discount in 1989 will be approximately $583,000. The conditions that pertain to this discount are presented in Exhibit F (pg. 11).

The process utilized for developing the 1989 rates is similar to the methodology used in the past, and incorporates policies which are in conformity with sound and appropriate rate making practices used by similar organizations, and is generally accepted as appropriate regulatory practice.

The methodology used in developing the 1989 Rates proceeded through the following four steps:

- o Legislative Analysis - A review was made of the various state legislation affecting the rate setting process, including the Act creating the MWRA. The variety of legislation affecting rates substantially prescribes the method of setting rates.

- o Financial Analysis - A detailed analysis, including projections of the financial condition of the Commission, was performed for calendar years 1988 and 1989. Forecasts were made of all operating costs, MWRA assessments, debt service, working capital requirements and capital needs.

- o Water Use Analysis - An analysis was performed of the sources and uses of water to forecast water consumption and wastewater flows and to estimate, for billing purposes, the amount of water and sewer service utilized by BWSC customers.

- Rate Calculation - Prior to determining the approved rates, miscellaneous revenues, adjustments, delinquencies and allowances were estimated. Based upon these estimates, and appropriate legal considerations, the approved rates were calculated as specified below.

Exhibit A

APPROVED WATER AND SEWER RATES
Effective as of January 1, 1989

Consumption (Cu. Ft./Day)	<------Water Rate------> /1000 cu.ft.	/1000 gal.	<------Sewer Rate------> /1000 cu.ft.	/1000 gal.
First 19	$14.710	$1.966	$16.170	$2.162
Next 20	$14.730	$1.970	$16.360	$2.187
Next 50	$14.770	$1.975	$16.550	$2.213
Next 70	$14.810	$1.979	$16.740	$2.238
Next 190	$14.850	$1.985	$16.930	$2.263
Next 250	$14.870	$1.988	$17.120	$2.289
Next 700	$14.910	$1.994	$17.310	$2.315
Next 1700	$14.950	$1.999	$17.500	$2.339
Next 3000	$14.980	$2.002	$17.690	$2.365
Over 5999	$15.010	$2.007	$17.870	$2.389

EXHIBIT B

BOSTON WATER AND SEWER COMMISSION
IMPACT OF EXISTING AND APPROVED RATES (1)
PER QUARTERLY BILLING PERIOD

CUSTOMER TYPE	METERED USE CU FT DAY(2)	RATE BLOCK(3)	CURRENT WATER	CURRENT SEWER	CURRENT COMBINED	APPROVED WATER	APPROVED SEWER	APPROVED COMBINED	INCREASE PER QUARTER
1 FAMILY RESIDENTIAL	8	1	$8.90	$8.69	$17.59	$10.71	$11.77	$22.48	$4.89
1 FAMILY RESIDENTIAL	17	1	$18.92	$18.46	$37.38	$22.76	$25.01	$47.77	$10.39
1 FAMILY RESIDENTIAL	33	2	$36.75	$36.02	$72.77	$44.20	$48.80	$93.00	$20.23
2 FAMILY RESIDENTIAL	53	3	$59.09	$58.18	$117.27	$71.06	$78.82	$149.88	$32.61
3 FAMILY RESIDENTIAL	80	3	$89.26	$88.21	$177.47	$107.35	$119.48	$226.83	$49.36
4 FAMILY RESIDENTIAL	107	4	$119.49	$118.44	$237.93	$143.70	$160.46	$304.16	$66.23
6 FAMILY RESIDENTIAL	160	5	$178.92	$178.02	$356.94	$215.14	$241.21	$456.35	$99.41
MULTI-FAMILY RESIDENTIAL	334	5	$374.47	$375.79	$750.26	$450.27	$509.28	$959.55	$209.29
COMMERCIAL	535	6	$600.70	$606.61	$1,207.31	$722.23	$822.16	$1,544.39	$337.08
GOVERNMENTAL	668	7	$750.60	$760.35	$1,510.95	$902.45	$1,030.56	$1,933.01	$422.06
LARGE RESIDENTIAL	1,003	7	$1,128.62	$1,149.64	$2,278.26	$1,356.99	$1,558.25	$2,915.24	$636.98
MEDIUM GOVERNMENTAL	1,337	8	$1,505.61	$1,538.26	$3,043.87	$1,810.30	$2,085.03	$3,895.33	$851.46
SMALL INDUSTRIAL	2,005	8	$2,261.20	$2,323.03	$4,584.23	$2,719.08	$3,148.82	$5,867.90	$1,283.67
LARGE RESIDENTIAL	2,941	8	$3,319.94	$3,422.65	$6,742.59	$3,992.46	$4,639.40	$8,631.86	$1,889.27
LARGE INSTITUTIONAL	4,679	9	$5,288.90	$5,485.88	$10,774.78	$6,361.51	$7,436.21	$13,797.72	$3,022.94
MEDIUM COMMERCIAL	6,016	10	$6,803.70	$7,073.85	$13,877.55	$8,184.13	$9,588.78	$17,772.91	$3,895.36
LARGE COMMERCIAL	10,695	10	$12,117.55	$12,690.01	$24,807.56	$14,575.22	$17,197.63	$31,772.85	$6,965.29
MEDIUM INDUSTRIAL	13,369	10	$15,154.35	$15,899.58	$31,053.93	$18,227.66	$21,546.01	$39,773.67	$8,719.74
VERY LARGE RESIDENTIAL	20,053	10	$22,745.24	$23,922.32	$46,667.56	$27,357.41	$32,415.33	$59,772.74	$13,105.18
LARGE INSTITUTIONAL	30,080	10	$34,132.70	$35,957.63	$70,090.33	$41,053.39	$48,720.94	$89,774.33	$19,684.00
VERY LARGE INSTITUTIONAL	53,476	10	$60,703.07	$64,039.61	$124,742.68	$73,010.22	$86,766.81	$159,777.03	$35,034.35
VERY LARGE INDUSTRIAL	66,845	10	$75,885.98	$80,086.29	$155,972.27	$91,271.07	$108,507.08	$199,778.15	$43,805.88
VERY LARGE GOVERNMENTAL	86,898	10	$98,659.77	$104,155.70	$202,815.47	$118,661.66	$141,116.66	$259,778.32	$56,962.85

(1) FOR RATES APPROVED TO BE EFFECTIVE JANUARY 1, 1989

(2) 1 CUBIC FOOT = 7.48 GALLONS

(3) REPRESENTS THE FINAL RATE BLOCK INTO WHICH AVERAGE DAILY CONSUMPTION FALLS

Exhibit C
APPROVED
SPECIAL SERVICE FEE SCHEDULE

Type	Fee
Lien Certificate(1)	$100 Maximum
Return Check Processing Fee	$ 15
Cross Connection Inspection(2)	$ 90
Water Service Installation	$135-$425 (depending on pipe size)
Excavation	Cost Basis ($900 deposit required)
Fire Pipe Excavation	Cost Basis ($2,500 deposit required)
Water Pipe Inspection	$125
Sewer Pipe Inspection	$125
Water and Sewer Construction Multi-day Inspection (3)	$175 per diem
Water Turn-on (4)	$ 30
Water Turn-off (4)	$ 30
Fire Flow Test	$165
Temporary Connection (Hydrant Permit)	
2 days or less	$ 25
Greater than 2 days	$ 50 per 90 day period or fraction thereof, plus water usage ($250 deposit required)
Special Meter Test (5) (meters 2 inch or smaller)	$40 deposit
Special Meter Test (5) (meters 3 inch or larger)	Cost Basis
Drain Layers License	$ 13
Construction Plans and Drawings (6)	$ 4
Special Consultation Services (7) Rates per hour for Commission staff personnel:	
Senior Management	$ 75
Professional and Other	$ 50
Clerical	$ 25
Frozen Meter Replacement (8)	Cost Basis
Septage Disposal (9)	Sewer Rate plus $0.038/gallon of septage disposed.

APPROVED
SPECIAL SERVICE FEE SCHEDULE (CONT.)

(1) In accordance with M.G.L. Chapter 60, Section 23A: "...for land of less than one acre upon which there is no permanent structure a fee of ten dollars; for land upon which is situated no more than a single family residence and outbuildings a fee of fifteen dollars; for land upon which is situated no more than a three family residence with outbuildings a fee of twenty dollars; for land upon which is situated a residence for four or more families a fee of forty dollars; for land upon which is situated a commercial, industrial or public utility structure a fee of one hundred dollars; for farms, forest land and all other real property a fee of fifty dollars. In no case shall the fee exceed one half of one percent of the assessed value of the real estate...." Maximum fee, one hundred dollars.

(2) Requires semi-annual inspection of each device.

(3) Assessed daily while providing water and sewer inspectional services on construction projects of one or more days duration.

(4) For services affected by the Commission's termination of service procedures.

(5) No charge if meter is over-registering, based on A.W.W.A. standards or if Commission ordered test.

(6) Additional information concerning maps may be obtained from the Commission on request. Public agencies and Commission consultants receive prints at no charge. The cost per map is detailed below:

Type	Cost
I. Base Maps	
- Prints	$ 4/sheet
- Paper Sepias	$ 4/sheet
- Mylar Sepias*	$ 50/set plus printer's charge
- Washoff Mylars*	$ 50/set plus printer's charge
II. Water and Sewer Maps	
- Prints	$ 4/sheet
- Paper Sepias	$ 4/sheet
- Mylar Sepias	Not Available
- Washoff Mylars	Not Available

*Sold to government agencies only

(7) For special water and sewer consultation services rendered by Commission staff to persons other than rate payers of the Commission and for special engineering and legal services.

(8) For replacement of frozen meters.

Size of Meters	Replacement Fee
5/8"	$ 87.00
3/4"	114.00
1"	130.00
1 1/2"	256.00
2"	320.00

(9) This charge applies to Contractors who dispose septage at the Commission's septage disposal site. Billing will be made quarterly.

Exhibit D

APPROVED
SPECIAL FIRE SERVICE FEES:
(INTERNAL SPRINKLERS AND STANDPIPES)

Size of Service	Quarterly Charge
4 inch or smaller	$ 62.00
6 inch	$140.00
8 inch or larger	$249.00

Exhibit E

APPROVED
LATE PAYMENT CHARGE

.03288% interest per day compounded with each billing on all amounts past due (greater than 45 days from the billing date).

Exhibit F

APPROVED
DISCOUNT FOR ELDERLY AND FULLY DISABLED

25% discount on all water charges billed. This discount is applicable only to owner-occupied structures with one to four dwelling units.

II. RATE HISTORY

Section II.1 Rate History

The Boston Water and Sewer Commission began providing water and sewer services to the City of Boston on August 5, 1977. Prior to then, the City of Boston had provided water and sewer services through its Public Works Department. An Act of the State Legislature transferred the responsibility for providing such services to the Commission, a political subdivision of The Commonwealth of Massachusetts. The statute mandated that fees, rates and charges for water and sewerage services be established on just and equitable standards. It also provided that all consumers, whether public or private, taxpayer or tax-exempt, resident or commuter, pay their fair share of the costs of such services based on their actual usage.

Two important rate changes resulted from the Commission's Enabling Legislation. First, it specified the use of a flat rate structure (i.e., a fixed amount per cubic foot as compared to a declining charge for increased consumption as allowed under the City of Boston). Second, it required the provision of a discount on water charges for the elderly and fully disabled. The Commission incorporated these mandates in all of its detailed rate studies from 1978 through 1984.

In 1985, the Massachusetts Legislature created the Massachusetts Water Resources Authority, also a political subdivision of The Commonwealth of Massachusetts. It did so in order to improve the delivery of water and wastewater services, encourage conservation, and reduce water pollution in Eastern

Massachusetts. Prior to 1985, the Metropolitan District Commission (MDC), a state agency, had provided water and wastewater services to the Commission and other communities in the Metropolitan Boston area. The MWRA took over operating responsibility from the MDC on July 1, 1985.

The Authority's Enabling Legislation prohibited the use of the declining block rate structure, but authorized local bodies, including the Commission, to establish charges for rates on an ascending unit or progressive rate based on quantity of water consumed. It also called for a comprehensive study of the environmental, social, and economic impacts of its water and sewer charges, which was completed in December, 1986.

In response to the MWRA's legislative mandates, the Commission undertook a review of its own rates in 1985. It examined and evaluated its existing rate structure, conservation policies and practices, and alternative rate structures that had become allowable under the passage of the MWRA's Enabling Legislation.

Commission staff determined that the need existed for an external stimulus to promote water conservation among its customers. Staff believed implementation of an ascending unit, or inclining block, rate structure provided the best alternative to promote conservation. Accordingly, the Commission adopted the staff's proposal for an inclining block rate structure in August, 1985.

Exhibit G (pg. 17) summarizes the water and sewer rates for the City of Boston from 1977 through 1988. The rates have generated sufficient revenues to recover all associated expenses since the Commission's assumption of operational responsibility for the system on January 1, 1978.

Section II.2 Water Rates

Water rates remained relatively stable from 1977 through 1984. The wholesale water rate charged by the MDC to members of the water district rose only $5 per million gallons from 1978 to 1984, or from $240 to $245 per million gallons. However, during this same period, the amount of water purchased by the Commission from the MDC decreased from 143 million gallons per day in 1978 to 117 million gallons per day in 1984, or a decline of 18 percent. As a result, the MDC's total water assessment to Boston declined during this period. Consequently, the Commission's declining wholesale water assessments absorbed some of the effects of increasing costs in other expense categories which allowed the Commission to hold its retail water rates steady.

The major factor forcing the Commission to increase its water rates since 1984 has been the substantial compounding increases in MWRA water assessments. Since the establishment of the MWRA, the wholesale water rate has increased 91.4 percent, from $245 per million gallons in FY 1984 to $469 per million gallons in FY 1988. The MWRA has been required to increase its water rates in order to fund improvements to its water distribution system, undertake a strong leak detection program, and implement a conservation program.

The Commission anticipates that the MWRA will need to continue to annually increase the wholesale water rate to its member communities. The MWRA projects that its water rates will increase by 40.7 percent in FY 1990 to $660 per million gallons.

Section II.3 Sewer Rates

While the Commission's water rates remained stable during the period 1978 to 1984, the effects of the following factors resulted in repeated increases to its sewer rates during the same time period. Prior to the Commission's creation in 1978, the City's sewer rates were subsidized by property taxes. The Commission's Enabling Legislation, however, mandated that the BWSC establish sewer rates at levels sufficient to recover the costs of operating the sewerage system. Federal and state wastewater requirements forced the Commission to implement costly programs to upgrade the sewerage system. During the same time period, the MDC increased the Commission's sewer assessment by approximately 33%.

Since the MWRA assumed operational responsibility from the MDC, sewer assessments to the Commission have increased by 227 percent, from a level of $8.825 million in FY 1985 to a level of $28.834 million in FY 1989. The Authority projects that its FY 1990 sewer assessment to the Commission will increase by an additional 45.9 percent to a level of approximately $41.911 million.

Currently, the MWRA projects annual increases in total water and sewer assessments to range between 30 and 45 percent over the next five years. The Commission will continue to monitor all rates and rate methodology proposals by the MWRA to ensure equitable assessments to the Commission.

III. DESCRIPTION OF BOSTON'S WATER AND SEWAGE SYSTEM

EXHIBIT G

BOSTON WATER AND SEWER COMMISSION

RATE HISTORY

(per 1,000 cubic feet)

	Water Rate	Sewer Rate	Combined Rate	% Change From Prior Year
1977(1)	$ 7.65	$ 1.00	$ 8.65	-
1978	$ 8.90	$ 3.96	$12.86	48.7%
1979	$ 7.55	$ 3.59	$11.14	(13.4%)
1980	$ 7.55	$ 4.04	$11.59	4.0%
1981	$ 7.55	$ 4.04	$11.59	0.0%
1982	$ 7.55	$ 4.94	$12.49	7.8%
1983	$ 7.48	$ 5.46	$12.94	3.6%
1984	$ 7.63	$ 6.28	$13.91	7.5%
1985(2)	$ 7.76	$ 7.22	$14.97	7.6%
1986(2)	$ 8.66	$ 9.60	$18.25	21.9%
1987(2)	$ 8.92	$10.70	$19.62	7.5%
1988(2)	$12.38	$12.70	$25.08	27.8%
1989(3)	$14.89	$17.21	$32.10	28.0%

(1) Water and sewer rates were established by the City prior to the creation of the Boston Water and Sewer Commission in 1978.

(2) Due to the shift to the inclining block rate structure in 1985, the water and sewer rates shown since then represent weighted averages.

(3) Effective as of January 1, 1989.

Section III.1 Water Distribution System

The Commission's water distribution system consists of water mains, service pipes, hydrants, valves, and gates. The Boston public water system has been in operation since 1848.

There are approximately 1,182 miles of mains, which range in size from 2 to 48 inches in diameter. The system also includes approximately 13,000 hydrants and a high pressure fire system serving downtown Boston.

The system contains four major water service (pressure) networks: 1) The Southern Low Service, 2) The Northern Low Service, 3) The Southern High Service, and 4) The Southern Extra High Service. In addition, a single connection to the Northern High Service System serves a small section of East Boston.

The Commission obtains its water from the MWRA. The MWRA's supply sources are the Quabbin and Wachusetts Reservoirs, which are located in western and central Massachusetts respectively. MWRA distribution reservoirs convey water from the supply reservoirs for delivery to the Commission's 29 metered connections with the MWRA distribution system.

Section III.2 Sewage Collection System

The Commission's sewer system collects wastewater and storm drainage in the City of Boston through approximately 85,000 wastewater service connections. The system consists primarily of conduits, which range in size from 6-inch clay lateral sewers to 20 by 15-1/2 foot concrete culverts. There are approximately 1,340 linear miles of sewers, including 535 miles of sanitary sewers, 490 miles of storm drains, and 315 miles of combined sewers. Other facilities include eight pumping stations, two gatehouses, 52 combined sewer overflow outlets, 137 regulators, and 119 tidegates.

The original backbone of the wastewater collection system was the Boston Main Drainage System, built between 1877 and 1884. It included five combined interceptors, the Calf Pasture pumping station and the Dorchester Bay tunnel.

Construction of the New Boston Main Interceptor and the New East Side Interceptor has been completed during the past year. This system is presently on-line serving the sewer needs of Boston Proper, the South End, Roxbury, Dorchester and South Boston. With their completion, the new systems replace the Boston Main Drainage System as the major conduit of wastewater for the City of Boston.

Additional collection facilities provide service to other parts of the City. Separate sanitary sewers and storm drains serve most of the other neighborhoods.

The collection system transports Boston's wastewater flows to MWRA facilities that carry the sewerage to MWRA's Nut Island plant in Quincy, or Deer Island plant in Boston for treatment and disposal.

IV. SOURCES AND USES OF WATER

Section IV.1 Sources and Uses of Water

Projecting water use for rate setting purposes involves four major factors that staff considered:

- Forecasting the user population.
- Assessing water use patterns.
- Assessing the impact of conservation and pricing structures on total consumption.
- Identifying losses in the system (through undermetering, leaks, etc.).

Section IV.2 User Population

The Commission currently serves approximately 87,600 accounts, including the City's residential population, its businesses and industries, and its public and private institutions. Boston has a population of 573,600 residents (1). The City's daytime population increases by approximately 340,000 workers; 70,000 shoppers, tourists and business visitors; and 75,000 commuting students.

Residential customers account for approximately 86 percent of all metered accounts but only about 23 percent of the consumption volume. Commercial and industrial users have the largest impact on water consumption.

New residential construction in Boston primarily accounts for the number of new residential water accounts. The City of Boston reports that the number of building permits issued for residential units in Boston has slowed since last year. Staff

(1) Boston Redevelopment Authority, Department of Policy Development and Research, June, 1988.

expects new residential construction to hold steady at the current level through 1989. Therefore, staff predicts modest growth in the number of new residential accounts.

On the commercial and industrial side, the Boston Redevelopment Authority projects about $238 million of private investment, non-residential construction projects to be completed in 1989. These projects include office, retail, medical, institutional, parking and transportation-related, industrial, and hotel/convention facility construction. This represents a $699 million decline from the projected 1988 year-end total of $937 million. This lowering of private investment construction completion in 1989 will moderate growth in commercial and industrial water accounts and the associated water usage.

Based on this analysis, the Commission predicts only modest growth in the number of accounts it will serve in 1989.

Section IV.3 Water Use

Exhibit H (pg. 26) shows the amount of water the Commission has bought from the MDC/MWRA, the amount the Commission billed to its customers, and the ratio of billings to total MDC/MWRA water purchases. Exhibit G demonstrates that while the Commission's purchases from the MDC/MWRA have decreased by 19 percent since 1976, the Commission's sales to consumers have only increased by 8 percent in the same period. System losses have decreased from over 50 percent in 1976 to approximately 33 percent in 1988.

Older cities such as Boston have always experienced rather large water system losses, where the age of the system contributes significantly to this problem. The Commission has undertaken a number of programs to correct system losses. The results show clearly in the decline of wholesale water purchases from the MDC/MWRA and the decline in system losses during the past decade. A description of the current leak-detection, system improvement and meter-upgrade programs that the Commission is undertaking can be found in Section VI.3, Program Objectives.

Water consumption by Boston consumers has increased moderately over the past decade. Water sales increased by three percent when the Commission began billing the City of Boston for its water consumption in 1978. However, from 1978 to 1983, total billable gallons actually declined. Since 1983, water sales have risen from 76.9 million gallons per day to a projected 81.5 million gallons per day in 1988, or an increase of approximately 6 percent. This increase reflects the results of the Commission's efforts to upgrade faulty meters, institute an improved billing system, and the economic growth of the City.

In 1989, the Commission forecasts that consumption will increase moderately to 82 million gallons per day.

Section IV.4 Conservation and System Improvements

Over the past ten years, withdrawals from the MWRA's water supply systems have approached or exceeded the average safe yield (approximately 300 million gallons per day) of its reservoirs. The MWRA has accepted the responsibility to meet the ongoing legitimate water supply needs of its constituency, and to manage the assets of its water delivery system in order to conserve water at the wholesale and retail levels. The MWRA's conservation measures are directed toward minimizing leakage, waste, and excessive use. The MWRA has adopted policies to institute educational programs to promote conservation, and has encouraged its member communities to adopt conservation-oriented rate structures.

The Commission, the largest user of water in the MWRA system, is directly affected by the MWRA legislation and policies. In response, the Commission has placed added emphasis on its leak detection and metering programs in an effort to reduce water purchased from the MWRA and to comply with the Authority's mandate to conserve water resources.

In addition to the above conservation efforts, Staff investigated the impact of various rate structures on customers' consumption habits, and with a supporting recommendation from the Commission's rate consultants, Camp, Dresser & McKee, the Commission adopted an inclining block rate structure in 1985.

The approved 1989 water and sewer rates reflect this conservation-oriented rate structure.

Section IV.5 City of Boston, Billable Water Volume

The Commission billed the City of Boston for water and sewer use beginning in 1978. Estimates of water usage were used from 1978 to 1980 because many City facilities were unmetered.

Since 1981, actual metered billings have been initiated for the following City departments: Fire, Libraries, Police, Public Works, Printing, Schools, Traffic and Parking, and the Charles Street Jail.

Other City departments receive estimated billings. These departments include the City's Health and Hospital Department, Parks and Recreation, the Deer Island Jail and other miscellaneous properties.

Staff uses a model that was originally developed by Coopers and Lybrand, a public accounting and consulting firm, to estimate the water use of the unmetered departments. For 1989, staff estimates that these unmetered City departments will use an average of 1.5 million gallons per day. This number is added to the Commission's projection of total metered water use.

The program to meter all City facilities will continue to be implemented wherever feasible and cost-effective. Meters will begin to be installed for the City's Health and Hospitals Department in 1989. The Commission plans to complete this work in 1990.

Section IV.6 Estimating the Number of Billable Gallons

An analysis of the major factors involved in forecasting water usage (i.e., population, conservation, city redevelopment, leak detection and metering programs) indicates a probable increase in billable water usage during 1989. Staff estimates that total water sales, including the City of Boston unmetered, will be 82 million gallons per day. This represents a 0.6 percent increase from 1988. Staff expects that sewer sales will follow the same usage trends as water. Staff projects that total sewer sales will be 80.8 million gallons per day.

Exhibit H

WATER PURCHASES AND BILLING STATISTICS

Millions of Gallons Per Day (MGD) (1)

	Purchased Water from MDC/MWRA		Water Billed	Billings As
	Total MDC/MWRA System	Boston Consumption	To Boston Users	A Percent Of Purchases
	(MGD)	(MGD)	(MGD)	
1988 (2)	311.1	122.0	81.5	66.8%
1987	307.1	122.9	81.8	66.6%
1986	293.4	120.9	81.3	67.2%
1985	299.0	119.2	81.3	68.2%
1984	291.0	117.3	78.0	66.5%
1983	293.6	125.3	76.9	61.4%
1982	297.3	128.6	78.6	61.1%
1981	309.1	132.2	78.4	59.3%
1980	312.7	135.2	80.6	59.6%
1979	307.9	137.3	81.5	59.4%
1978	317.1	143.0	79.9(3)	55.9%
1977	318.9	146.1	76.1	52.1%
1976	317.2	150.4	74.8	49.7%

(1) 7.48 gallons = 1 cubic foot

(2) Projected

(3) Beginning in 1978, the Commission began billing the City of Boston (e.g., Schools, Health and Hospital Facilities, Jails, etc.) which accounts for approximately 3% of billable gallons.

V. RATE SETTING METHODOLOGY

Section V.1 Rate Setting Methodology

The Commission develops its rates in accordance with legislative mandates, its financial requirements, and generally-accepted ratemaking principles. Staff reviews each of these areas to ensure that the Commission's rates meet the prescribed tests. This chapter describes the steps the Commission takes in order to develop its rates.

Section V.2 Legislative Review

Staff reviewed pertinent federal and state legislation, as well as Commission policy, to establish a framework for setting rates. This review produced the following guidelines:

- The Commission must be self-sustaining.
- Water and sewer rates must be proportionate.
- The Commission must bill the City of Boston for water and sewer services. Prior to 1978 the City was not billed.
- The discount for the elderly and fully disabled, as required by the Enabling Legislation, is applied to water service.
- The sewer rate must meet certain federal requirements in order to remain an approved EPA user charge, and for the Commission to remain eligible to receive federal and state grants to finance major capital projects for its sewer system.
- Legislation creating the MWRA permits the use of an inclining block rate structure and mandates conservation efforts in the region.

Specifically, the Enabling Legislation requires the Commission's rates to be sufficient to:

1) recover current expenses,
2) pay all debt service,
3) create and maintain reasonable reserves required by any bond resolution,
4) provide funds for paying the cost of all necessary repairs, replacements and renewals of the system, and
5) pay or provide for any and all other amounts that the Commission may be obligated to pay or provide for by law or contract.

Section V.3 Rate Revenue Requirements

The Commission determines its gross revenue requirement through its Operating Budget and projections of revenue adjustments. Generally-accepted rate making practices suggest that future rates be based on future costs. The approved 1989 Operating Budget specifies the rate revenue requirement used to develop the approved rates.

Section V.4 Capital Costs

Capital projects involve renewal, replacement, extensions, and improvements to the water and sewer system. The Commission annually prepares a three-year Capital Improvement Program that specifies the capital projects the Commission will undertake.

Historically, BWSC has funded the rehabilitation, or in-kind replacement, of water and sewer lines as well as replacement of meters from current rate revenues; all other projects have been funded with bond proceeds and grants when available. With respect to this policy, the Commission has utilized encumbrance accounting for the rate-funded capital projects. This accounting method has the effect of freezing resources, so they may be committed to a particular action.

In 1988, The Commission approved the utilization of unexpended bond proceeds from previous bond issues to pay for renewal and rehabilitation projects that were begun in 1987 and 1988. This decision was necessitated in part by federal tax laws governing the use of tax-exempt bonds. In addition, the utilization of the unexpended bond proceeds for 1987 and 1988 renewal and replacement projects permitted the Commission to realize a lower interest rate on the remarketing of its 1985 variable rate bond issue.

For 1989, the funding for capital projects that has been included in the calculation of the proposed water and sewer rate schedule represents the projected current year expenditures associated with the 1989 renewal and replacement projects. The approved 1989 Operating Budget provides detailed information on the Commission's debt service payments, required deposits to reserve funds, and the projected expenditures for the Renewal and Replacement projects included in the approved 1989-1991 Capital Improvement Programs.

In addition, under stipulations of the Commission's General Revenue Bond Resolution, the Commission is required to maintain rates and charges sufficient to produce net revenues (as defined in the Resolution) equal to at least 125% of the maximum principal and interest payment due in any future year.

Section V.5 Other Income

The Commission reduces its total revenue requirement with other income it receives. This other income includes fees for special services the Commission provides, interest earned on certain operating and reserve funds, fire pipe fees, and late payment charges. In addition, the Commission applies any surplus or deficit from the previous year to the current rate revenue requirement.

Section V.6 Allocation of Costs

The Commission allocates its rate revenue requirement between its water and sewer components. Many of the Commission's costs can be directly allocated to either water or sewer services (for example, the Commission's MWRA assessments and its water and sewer operations costs). The Commission allocates its debt service costs to water or sewer according to the applied purpose of the bond.

However, certain administrative and other indirect costs do not fall neatly into a water or sewer component. The Commission allocates other operating costs according to the water and sewer allocation ratios developed by its directly-allocated operating costs.

Section V.7 Billable Gallons

The Commission divides its net water rate revenue requirement and its net sewer rate revenue requirement by the projected number of billable gallons for each category. To determine the billable gallons estimate, the Commission reviews and analyzes population and economic growth trends for the City of Boston, consumption patterns by different users, and the impact of conservation on water consumption.

Section V.8 Design of Rates

In 1985, the Commission adopted a ten-tier inclining block rate structure to encourage conservation. Staff is recommending the continuation of this rate structure for 1989. In addition, in accordance with the Commission's Enabling Legislation, the approved rates continue to offer a 25 percent discount on water charges for elderly and fully disabled homeowners in structures with one to four dwelling units.

VI. FINANCIAL ANALYSIS

Section VI.1 Introduction

Generally-accepted ratemaking principles suggest that future rates be based on future costs. Therefore, the Commission bases its approved rates on its 1989 Operating Budget.

The second section of this chapter summarizes the 1989 Operating Budget. Subsequent sections explain the major expense and revenue forecasts made in the determination of the net revenue requirement.

Exhibit I (pg. 33) presents the basic equation involved in determining the net revenue requirement as well as delineation of the revenue and expense categories.

As defined by statute, the Commission must be self sustaining; it is mandatory that gross revenues be sufficient to meet the cost of total expenses, including any revenue adjustments. The gross revenue requirement, reduced by other revenues, including the prior year's surplus, equals the rate revenue requirement. The rate revenue requirement divided by the total billable gallon figure is used to establish the water and sewer rate schedule.

Exhibit I

RATE REVENUE REQUIREMENT METHODOLOGY

TOTAL EXPENSES

Plus REVENUE ADJUSTMENTS

Less OTHER REVENUES

Equals RATE REVENUE REQUIREMENT

TOTAL EXPENSES:
- Massachusetts Water Resources Authority Assessment
- Operating Expenses:
  - Wages and Related Benefits
  - Supplies and Materials
  - Contractual Repairs to System, Vehicles and Equipment
- Indirect Expenses:
  - Professional Services
  - Damage Claims
  - Utilities, Space and Equipment Rental
  - Other
- Capital Projects (Renewal and Replacement)
- Interest Expense
- Principal Repayment
- Deposit to Operating Reserve Fund
- Deposit to Renewal and Replacement Reserve Fund
- Deposit to Debt Service Stabilization Fund
- Working Capital Allowance

PLUS:

REVENUE ADJUSTMENTS:
- Elderly and Fully Disabled Discounts
- Billing Adjustments
- Bad Debt Allowance

LESS:

OTHER REVENUES:
- Investment Income
- Miscellaneous Revenues:
  - -Special Service Fees
  - -Late Payment Charges
  - -Fire Service Fees
- Prior Period Surplus

EQUALS:

RATE REVENUE REQUIREMENT:
- Water
- Sewer

Section VI.2 1989 Operating Budget Summary

The rate revenue requirement stems from the approved 1989 Operating Budget. Exhibit J (pg. 38) presents the Operating Budget for 1989 by major revenue and expense category.

The Commission developed the 1989 Operating Budget based on the program priorities and performance objectives of each department. This process defined each department's sense of purpose and mission, promoted greater departmental accountability, and matched scarce resources with critical program objectives.

Total revenues and expenses proposed for 1989 are $127.4 million as presented in Exhibit J (pg. 38). This represents an increase of 25.0 percent over the 1988 Operating Budget.

The projected increase in the MWRA Assessment to the Commission represents the most significant increase in the 1989 Operating Budget. The Commission is budgeting $64.1 million in 1989 for the projected MWRA assessment expense, an increase of 52.5 percent over the 1988 budget of $42.0 million. This includes the 36 percent FY 1989 MWRA rate increase, the projected 45 percent increase in the MWRA's rates effective July 1, 1989, as well as the additional monies that the Commission must transfer to its MWRA Assessment Fund in accordance with the requirements of the Commission's General Revenue Bond Resolution.

The 52.5% increase in budgeted MWRA charges compares with a net increase of only 5.7% in all other operating expenses of the Commission, including debt service, renewal and replacement expenditures and reserve fund payments. This modest increase in

the Commission's other current expenses is primarily due to a rigorous budgetary review process, to changes in the Commission's bond portfolio that have reduced debt service costs, and to the change of budgeting renewal and replacement expenses to a forecasted current year expenditure basis.

In summary, the approved 1989 expense budget represents a very lean estimate of the resources required to provide ongoing water and sewer services and to achieve the priority objectives outlined below. The programmatic initiatives in this budget, such as leak detection, aggressive collection of overdue accounts and improved fiscal controls, will ultimately result in cost savings to the Commission's rate payers.

Section VI.3 Program Objectives

Staff will focus on five priority areas in 1989 that span all departments of the Commission. These objectives will improve the Commission's ability to manage its operations, track its resources and control its finances. The five areas with a sample of key objectives are:

1. Reducing Unaccounted for Water

- Survey 700 miles of water lines to detect leaks in the system.

- Increase by 20% the number of locking devices on hydrants to prevent illegal use and water losses.

- Increase the large meter testing program which improves accuracy in billing by testing 350 large meters, a 250% increase from 1988.

2. Promoting Affirmative Action

- Increase the percentage of minority employees from 13% to 15% and the percentage of women employees from 15% to 19%.

- Ensure that 15% of purchasing contracts are awarded to minority-owned firms and 5% to women-owned firms.

- Ensure that all staff have attended at least one sensitivity training session by the end of the year.

3. Improving Accountability and Control Procedures

- Prepare detailed reporting formats and procedures to monitor departments' performances on 1989 goals and objectives.

- Develop quarterly forecasts to analyze year-end revenues and actual expenditures relative to budget and the Commission's year-end surplus or deficit position.

- Revise and implement new policies and procedures to reduce delinquent accounts by 25%.

- Settle all cases of disputed bills within one year of being filed.

- Pursue, via legal channels, all delinquent accounts over $2,500 and outstanding for more than one year.

- Define and establish a reporting format to track cash receipts as a percentage of quarterly-billed revenues and set a year-end goal for increasing the collection rate.

4. Addressing Public Health Issues

- Increase on-demand water sampling tests from 200 in 1988 to 400 in 1989 per Environmental Protection Agency proposed copper and lead regulations.

- Replace 21,000 linear feet of lead water service pipes.

- Identify alternative disposal sites and techniques for the Commission's solid fill by the end of 1989.

5. Increasing Preventive Maintenance

- Increase flushing sewer and storm lines to 150,000 linear feet from 100,000 linear feet in 1988.

- Initiate a program to examine 4,000 small water valves and to replace an estimated 240 defective valves.

- Inspect and monitor 100 restaurants to ensure compliance with commercial discharge regulations.

In addition to the above five priority areas, the projected capital expenditures for renewal and replacement projects, which have been included in the 1989 Operating Budget, will pay for the initiation of the relaying and relining of approximately 16 miles of water pipe, fund the Commission's residential meter replacement program and allow for the inspection of approximately 20 miles of sewer line.

EXHIBIT J

1989 OPERATING BUDGET SUMMARY

(000'S)

RATE REVENUE REQUIREMENT	$127,449
Billing Adjustments	(8,741)
Discounts	(583)
Bad Debts	(1,150)
Prior Year Surplus	1,601
Net Adjustments to Prior Period	
Miscellaneous Revenues:	
-Investment Income	3,737
-Late Payment Income	2,600
-Other Income	734
-Fire Service	1,753
TOTAL REVENUES	$127,400

EXPENSES

MWRA Assessment	$ 64,100
Operating Expenses	34,104
Capital Projects (R & R)*	7,500
Interest Expenses	9,752
Principal Repayment	3,135
Deposit to Reserve Funds	3,926
Allowance for Working Capital	4,883
TOTAL EXPENSES	$127,400

*RENEWAL AND REPLACEMENT.

Section VI.4 Water and Sewer Expenses

The Commission divides its total expenses into their water and sewer components. The calculation of separate water and sewer rates requires this step. Exhibits M (pg. 48) and N (pg. 49) present the results of this allocation.

Many costs can be directly allocated to either water or sewer, such as the MWRA assessment, the Commission's largest cost component. However, other costs, such as indirect expenses, are not as clearly defined. In these cases, the Commission allocates these costs based upon the proportion of direct costs attributed to water and sewer services.

Section VI.5 Revenue Adjustments

A. Elderly/Fully Disabled Discount

Elderly homeowners, 65 years of age or older, or fully disabled homeowners, living in structures with one to four dwelling units, are currently eligible for a discount on their water bill for that structure. The current 25 percent discount will be continued for 1989. Staff estimates that approximately 13,000 customers will take advantage of the elderly/fully disabled discount in 1989. The total associated expense will be approximately $583,000.

B. Billing Adjustments and Bad Debt

Billing adjustments represent corrections to customers' accounts due to incorrect bills, inaccurate usage estimates, or, in the case of sewer use, situations where the amount of

wastewater returned is significantly less than the amount of water used. Staff estimates that billing adjustments will amount to $8.741 million in 1989.

Bad debt represents uncollectable amounts of billed revenues. The Commission has substantially reduced the percent of bad debt relative to total revenues in recent years due to its improved revenue collection programs. Staff estimates that bad debt will be approximately $1.1 million in 1989.

Section VI.6 Other Income

A. Special Service Fees

In addition to the provision of water and wastewater services, the Commission furnishes certain special services to the community. BWSC has established an approved fee schedule to recover the cost of providing these special additional services, where needed, without burden to the general rate payer.

The Commission reviews the approximate cost and frequency of special services each year. Based upon the results of this year's review, Staff recommended an increase for some of the fees to more accurately reflect the Commission's cost of rendering these services. The approved Special Service Fees are set forth in Exhibit C, (pg. 8). Exhibit K (pg. 42) presents the projected revenues for 1989 from the Special Service Fee Schedule.

For 1989, the Commission approved the institution of a Septage Disposal charge for contractors who dispose of septage in the Commission's system. Septage is defined as the liquid and solid wastes of primarily sanitary sewage origin that are removed from a cesspool, septic tank or similar receptacle. Currently,

the Commission allows 13 contractors to dispose of this septage in the system at no charge. The proposed Septage Disposal Fee has been calculated to recover the costs associated with the treatment of the septage which has been disposed and also the administrative costs associated with monitoring and billing for the disposal process to ensure compliance with relevant permitting requirements.

B. Late Payment Charges

Prior to 1978 water and sewer services were provided by the City of Boston, whose collection policy for delinquent customers did not encourage prompt payment. As unpaid bills eventually became liens on property, most bills were ultimately paid. However, on average, 27% of billings remained uncollected prior to water and sewer charges being added to property taxes.

To alleviate this problem, upon its inception the Commission adopted a late payment penalty to encourage more timely payments. This mechanism, in addition to other collection procedures instituted by the Commission, has been successful to the extent that the Commission now collects over 95% of its adjusted billings within 12 months.

The Commission approved for 1989 the continuation of the late payment charge at its current rate of .03288% per day compounded with each billing on all amounts past due 45 days (approximately equal to 12% per annum). Late charge revenue in 1989, net of a payment allowance of approximately 27%, is projected to be $2.6 million.

Exhibit K

REVENUE FROM SPECIAL SERVICE FEES

NAME	FEES	ESTIMATED FREQUENCY	ESTIMATED ANNUAL REVENUE
FIRE FLOW TEST	$165	110	$18,150
RETURN CHECK PROCESSING	$ 15	500	$7,500
TEMPORARY CONNECTION			
-greater than 2 Days	$195(1)	90	$17,550
-less than 2 Days	$ 25	45	$1,125
WATER PIPE INSPECTION	$125	500	$62,500
SEWER PIPE INSPECTION	$125	250	$31,250
WATER SERVICE INSTALLATION	$280(1)	0	$0
SPECIAL METER TESTS	$ 40(1)	200	$8,000
DRAIN LAYERS LICENSE	$ 13	500	$6,500
MULTI-DAY CONSTRUCTION INSPECTION	$175/diem	50	$8,750
FIRE PIPE EXCAVATION Cost Basis (approx.$2500)		1	$2,500
EXCAVATION Cost Basis (approx.$900)		1	$ 900
LIEN CERTIFICATE	$ 25(1)	4,500	$112,500
SCRAP SALES	-	-	$7,000
WATER TURN-ON/ TURN-OFF	$ 30(2)	360	$10,800
CONSTRUCTION PLANS AND DRAWINGS	$ 4	2,500	$10,000
FROZEN METER REPLACEMENT	$ 98(1)	215	$21,070
CROSS CONNECTION INSPECTION	$ 90	3,500	$315,000
SEPTAGE DISPOSAL	(3)	2.5 Million Gallons	$92,639
TOTAL:			$733,734

(1) Average cost
(2) For services affected by the Commission's termination of service procedures.
(3) Sewer charge plus $0.038/gallon of septage disposed.

C. Fire Pipe Charges

Generally-accepted rate making practices prescribe the imposition of fire pipe fees for private fire protection. The American Water Works Association suggests that:

> "The costs of providing private fire-protection service to individual properties represent a service not directly benefitting the general customer population of the utility. Such a service provides a measurable benefit that can reasonably be charged for through a system of rates and charges to those customers receiving private fire-protection service."(1)

The installation of a private fire-protection system has value to property owners and tenants. The private fire protection system reduces fire insurance premiums and enhances fire fighting capabilities.

The Commission incurs costs associated with providing the fire protection system. It must maintain and inspect the connections to the water system. Furthermore, it does not meter any water use by the fire protection system.

In past years fire pipe charges have been set to recover approximately three percent of the net water revenue requirement. The Commission approved the continuation of this practice for 1989.

The following table summarizes the proposed quarterly fire pipe charges for 1989:

Size of Service	Quarterly Charge
4 inch or smaller	$ 62.00
6 inch	$ 140.00
8 inch or larger	$ 249.00

The Commission has 4,055 such connections in the City. The anticipated revenue from these charges is $1.753 million for 1989.

(1) American Water Works Association Manual M26, "Water Rates and Related Charges," 1986.

D. Investment Income

The Commission has a number of large expenses that are paid in lump sum installments on a semi-annual basis, such as principal and interest payments. By utilizing effective cash management techniques, the funds accumulated to meet these expenses will earn investment income. In addition, the reserve requirements of certain trust indentures are also available for investment purposes. The investment income earned serves to reduce water and sewer rates.

Based upon a cash flow analysis, the Commission estimates investment income for the calendar year of 1989 will be $3.7 million. The Commission bases its projected investment income on an estimated average return of approximately 7.0% during 1989. It has developed this estimate in conjunction with its financial advisor, senior underwriter, and other appropriate economic sources.

E. Prior Year's Surplus

The Enabling Legislation requires that any surplus earned in any year be used to offset the following year's rates or be returned to the City of Boston. Conversely, any deficit must be recovered in the following year's rates. In the past, the Commission has elected to use any surplus to reduce rates.

Staff estimated a 1988 year-end surplus of approximately $1.6 million (see Exhibit L, pg. 45). This surplus has been incorporated into the rate calculation to decrease the 1989 water and sewer rate revenue requirements.

Exhibit L

PROJECTED 1988 SURPLUS ANALYSIS
(000'S)

	Estimated @ 12/31/88 (unaudited)
1988 REVENUES	
OPERATING REVENUES	
Billed Water & Sewer Charges	$94,203
Billing Adjustments	(6,272)
Discounts	(475)
Bad Debts	(74)
Total Net Operating Revenues	$87,382
OTHER REVENUES	
Prior Year Surplus	$ 3,448
Other Income	3,575
Investment Income	3,930
Total Other Revenues	$10,953
TOTAL ACCRUED REVENUES	$98,335
1988 EXPENSES	
Direct Operating Expenses	$30,724
MWRA Assessment	40,699
Capital Projects Renewal & Replacement	(6,470)
Debt Service	15,466
Deposit to Reserve Funds	3,465
Provision for Working Capital	$12,850
TOTAL CURRENT EXPENSES	$96,734
Excess 1988 Revenues over 1988 Expenses (Available for Reduction to 1989 Rate Revenue Requirement (1)	$ 1,601

(1) The distribution of this 1988 surplus has been allocated to the water and sewer rate revenue requirements with water accounting for $743,000 and sewer for $858,000. This allocation reflects the relative ratios of the water and sewer rate revenue requirement adopted in 1988 (i.e., Water - 46.4% Sewer - 53.6%).

VII. RATE CALCULATION

Section VII.1 Rate Calculation

The Commission must set rates to fully recover its total expenses, including debt service and revenue adjustments. This section calculates the water and sewer rate revenue requirements, and develops the water and sewer rates. Chapter IV provides an overview of the Commission's ratemaking process. Exhibit I (pg. 33) displays the formula to determine the Commission's rate revenue requirement. Chapter VI addresses the expenses, revenue adjustments and other income sources that go into calculating the water and sewer rate revenue requirements.

Section VII.2 Determination of Rate Blocks

In 1985 the Commission undertook a major study of its rate structure. As a result of that study, the Commission adopted a ten-tier, inclining block rate structure. The Commission has maintained that rate structure in each of its succeeding rate setting processes since 1985.

The Commission approved the continuation of this rate structure for 1989. The consumption level of each of the rate blocks will remain the same as established in 1985. The Commission approved this structure in order to maintain equity between similar types of customers, encourage conservation, raise adequate revenues, and maintain rate continuity.

Section VII.3 Water and Sewer Rate Calculations

Exhibits M (pg. 48) and N (pg. 49) present the calculation of the water rate revenue requirement and sewer rate revenue requirement respectively. The Commission estimates the following rate revenue requirements for 1989:

Water - $59,591,000

Sewer - $67,858,000

Exhibits O (pg. 50) and P (pg. 51) show the calculation of the water and sewer rates respectively. These rates are based on the water and sewer rate revenue requirements determined in Exhibits M and N, the billable gallons estimated in Chapter V, and the proposed rate structure. Exhibit B (pg. 7) illustrates the impact of the approved rates on various users.

EXHIBIT M

1989 WATER RATE CALCULATION

(000'S)

REVENUES

WATER RATE REVENUE REQUIREMENT	$59,591
Billing Adjustments	(4,087)
Discounts	(583)
Bad Debts	(538)
Prior Year Surplus	743
Net Adjustments to Prior Period	
Miscellaneous Revenues:	
-Investment Income	1,747
-Late Payment Income	1,216
-Other Income	343
-Fire Service	1,753
TOTAL WATER REVENUES	$60,185

EXPENSES

MWRA Assessment	$26,794
Operating Expenses	17,388
Capital Projects (R & R)*	5,865
Interest Expense	4,181
Principal Repayment	1,465
Deposit to Reserve Funds	2,002
Allowance for Working Capital	2,490
TOTAL WATER EXPENSES	$60,185

*Renewal and Replacement.

EXHIBIT N
1989 SEWER RATE CALCULATION
(000'S)

REVENUES

SEWER RATE REVENUE REQUIREMENT	$67,858
Billing Adjustments	(4,654)
Discounts	0
Bad Debts	(612)
Prior Year Surplus	858
Net Adjustments to Prior Period	
Miscellaneous Revenues:	
-Investment Income	1,990
-Late Payment Income	1,384
-Other Income	391
-Fire Service	0
TOTAL SEWER REVENUES	$67,215

EXPENSES

MWRA Assessment	$37,306
Operating Expenses	16,716
Capital Projects (R & R)*	1,635
Interest Expense	5,571
Principal Repayment	1,670
Deposit to Reserve Funds	1,924
Allowance for Working Capital	2,393
TOTAL SEWER EXPENSES	$67,215

*Renewal and Replacement.

EXHIBIT O

Water Rate:

1989 Approved Rate Revenue Requirement $59,591,000

BOSTON WATER AND SEWER COMMISSION
REVENUE ANALYSIS FOR APPROVED WATER RATES

CUBIC FEET PER DAY USAGE BLOCK	ESTIMATED BILLED USAGE (CU. FT.)*	ESTIMATED BILLED USAGE (000'S GAL.)	BILLED USAGE (PERCENT)	APPROVED RATE ($/1000 CF)	ESTIMATED REVENUE PER BLOCK
0-19	68,822,995	514,796	1.72%	$14.710	$1,012,386
20-39	256,485,695	1,918,513	6.41%	$14.730	$3,778,034
40-89	554,985,428	4,151,291	13.87%	$14.770	$8,197,135
90-159	312,504,412	2,337,533	7.81%	$14.810	$4,628,190
160-349	368,523,128	2,756,553	9.21%	$14.850	$5,472,568
350-599	290,897,193	2,175,911	7.27%	$14.870	$4,325,641
600-1299	458,953,342	3,432,971	11.47%	$14.910	$6,842,994
1300-2999	456,152,406	3,412,020	11.40%	$14.950	$6,819,478
3000-5999	339,313,369	2,538,064	8.48%	$14.980	$5,082,914
6000 OR >	894,698,930	6,692,348	22.36%	$15.010	$13,429,431
	4,001,336,898	29,930,000	100.00%		$59,588,771

REVENUE FROM APPROVED RATES (1/1/89 - 12/31/89)	$59,588,771
REVENUE REQUIREMENT	$59,591,000
SURPLUS/(DEFICIT)	($2,229)

* Based on 1989 projected billable consumption of 82.0 million gallons per day.

EXHIBIT P

Sewer Rate:

1989 Approved Rate Revenue Requirement $67,858,000

BOSTON WATER AND SEWER COMMISSION
REVENUE ANALYSIS FOR APPROVED SEWER RATES

CUBIC FEET PER DAY USAGE BLOCK	ESTIMATED BILLED USAGE (CU. FT.)*	ESTIMATED BILLED USAGE (000'S GAL.)	BILLED USAGE (PERCENT)	APPROVED RATE ($/1000 CF)	ESTIMATED REVENUE PER BLOCK
0-19	67,815,829	507,262	1.72%	$16.170	$1,096,582
20-39	252,732,246	1,890,437	6.41%	$16.360	$4,134,700
40-89	546,863,690	4,090,540	13.87%	$16.550	$9,050,594
90-159	307,931,176	2,303,325	7.81%	$16.740	$5,154,768
160-349	363,130,107	2,716,213	9.21%	$16.930	$6,147,793
350-599	286,640,160	2,144,068	7.27%	$17.120	$4,907,280
600-1299	452,236,952	3,382,732	11.47%	$17.310	$7,828,222
1300-2999	449,477,005	3,362,088	11.40%	$17.500	$7,865,848
3000-5999	334,347,807	2,500,922	8.48%	$17.690	$5,914,613
6000 OR >	881,605,775	6,594,411	22.36%	$17.870	$15,754,295
	3,942,780,747	29,492,000	100.00%		$67,854,695
		REVENUE FROM APPROVED RATES (1/1/89 - 12/31/89)			$67,854,695
		REVENUE REQUIREMENT			$67,858,000
		SURPLUS/(DEFICIT)			($3,305)

* Based on 1989 projected billable consumption of 80.8 million gallons per day.